thickness in a range from about 1,000 Å to about 4,000 Å, and wherein forming a refractory metal third layer over the metallization includes sputtering NiV over the refractory metal second layer to a thickness in a range from about 500 Å to about 2,000 Å.

A1 contd

33. (New) The process according to claim 17, wherein forming a refractory metal first layer over the metallization includes sputtering Ti over the metallization to a thickness in a range from about 500 Å to about 2,000 Å, wherein forming a refractory metal second layer over the refractory metal first layer includes sputtering NiV over the refractory metal first layer to a thickness in a range from about 1,000 Å to about 4,000 Å, wherein forming a refractory metal third layer over the metallization includes sputtering NiV over the refractory metal second layer to a thickness in a range from about 500 Å to about 2,000 Å, and wherein forming a refractory metal fourth layer over the refractory metal first layer includes sputtering NiV over the refractory metal third layer to a thickness in a range from about 1,000 Å to about 4,000 Å.

34. (New) The process according to claim 17, wherein forming a metallization includes:

forming a copper metallization pad over a substrate, wherein the copper metallization pad makes contact with a metallization selected from a range of metal-one (M1) to M6; and

wherein forming a refractory metal first layer over the metallization includes sputtering Ti over the metallization to a thickness in a range from about 500 Å to about 2,000 Å, wherein forming a refractory metal second layer over the refractory metal first layer includes sputtering NiV over the refractory metal first layer to a thickness in a range from about 1,000 Å to about 4,000 Å, wherein forming a refractory metal third layer over the metallization includes sputtering NiV over the refractory metal second layer to a thickness in a range from about 500 Å to about 2,000 Å, and wherein forming a refractory metal fourth layer over the refractory metal first layer includes sputtering NiV over the refractory metal third layer to a thickness in a range from about 1,000 Å to about 4,000 Å.

35. (New) The process according to claim 17, wherein forming a refractory metal first layer over the metallization comprises:

sputtering Ti over the metallization to a thickness in a range from about 500 arbitrary units to about 2,000 arbitrary units.

36. (New) The process according to claim 17, wherein forming a refractory metal first layer over the metallization includes sputtering Ti over the metallization to a thickness in a range from about 500 arbitrary units to about 2,000 arbitrary units, and wherein forming a refractory metal second layer over the refractory metal first layer includes sputtering NiV over the refractory metal first layer to a thickness in a range from about 1,000 of the arbirtary units to about 4,000 of the arbirtary units.

A1 contd

37. (New) The process according to claim 17, wherein forming a refractory metal first layer over the metallization includes sputtering Ti over the metallization to a thickness in a range from about 500 arbitrary units to about 2,000 arbitrary units, wherein forming a refractory metal second layer over the refractory metal first layer includes sputtering NiV over the refractory metal first layer to a thickness in a range from about 1,000 of the arbirtary units to about 4,000 of the arbirtary units, and wherein forming a refractory metal third layer over the metallization includes sputtering NiV over the refractory metal second layer to a thickness in a range from about 500 of the arbirtary units to about 2,000 of the arbirtary units.

38. (New) The process according to claim 17, wherein forming a refractory metal first layer over the metallization includes sputtering Ti over the metallization to a thickness in a range from about 500 arbitrary units to about 2,000 arbitrary units, wherein forming a refractory metal second layer over the refractory metal first layer includes sputtering NiV over the refractory metal first layer to a thickness in a range from about 1,000 of the arbirtary units to about 4,000 of the arbirtary units, wherein forming a refractory metal third layer over the metallization includes sputtering NiV over the refractory metal second layer to a thickness in a range from about 500 of

the arbirtary units to about 2,000 of the arbirtary units, and wherein forming a refractory metal fourth layer over the refractory metal first layer includes sputtering NiV over the refractory metal third layer to a thickness in a range from about 1,000 of the arbitrary units to about 4,000 of the arbitrary units.

A1 cont'd

39. (New) The process according to claim 17, further including:

nitriding at least one of the metal second layer and the metal fourth layer to form a nitrided metal alloy or a nitrided vanadium-doped metal.

40. (New) The process according to claim 17, wherein the refractory metal first layer, the refractory metal second layer, the refractory metal third layer, and the refractory metal fourth layer include a four-metal-layer stack, the process further including:

plating a bump precursor over the four-metal-layer stack.

41. (New) The process according to claim 17, wherein the refractory metal first layer, the refractory metal second layer, the refractory metal third layer, and the refractory metal fourth layer include a four-metal-layer stack, the process further including:

electroless plating a bump precursor over the four-metal-layer stack.

42. (New) The process according to claim 17, wherein the refractory metal first layer, the refractory metal second layer, the refractory metal third layer, and the refractory metal fourth layer include a four-metal-layer stack, the process further including:

plating a bump precursor over the four-metal-layer stack; and

further processing the four-metal-layer stack to remove the four-metal-layer stack except under the bump precursor.

43. (New) A process comprising:

forming a metallization;

forming a Ti first layer over the metallization to a thickness in a range from about 500 arbitrary units to about 2,000 arbitrary units;

forming a NiV second layer over the Ti first layer to a thickness in a range from about 1,000 of the arbirtary units to about 4,000 of the arbirtary units;

A1 contd

forming a Ti third layer over the NiV second layer to a thickness in a range from about 500 arbitrary units to about 2,000 arbitrary units; and

forming a NiV fourth layer over the Ti third layer to a thickness in a range from about 500 arbitrary units to about 2,000 arbitrary units.

44. (New) The process according to claim 43, wherein the Ti first layer, the NiV second layer, the Ti third layer, and the NiV fourth layer include a four-metal-layer stack, the process further including:

plating a bump precursor over the four-metal-layer stack; and

further processing the four-metal-layer stack to remove the four-metal-layer stack except under the bump precursor.

45. (New) The process according to claim 43, further including:

plating a Sn-containing solder through a mask onto the NiV fourth layer to form an electrically connective bump;

etching the first-through-fourth layers with an etch recipe that is selective to the solder; and

reflowing the solder.